

Claims

1. A detector for mounting to an air filter, comprising:

a housing adapted to be mounted to the filter;

a pressure responsive element mounted to the housing, the pressure responsive element having an upstream side adapted to be in communication with air pressure on an upstream side of the filter and a downstream side adapted to be in communication with air pressure on a downstream side of the filter, the pressure responsive element being movable in response to a sufficient difference in upstream and downstream pressures from a first position to a second position;

a stationary electrical contact mounted in the housing;

a movable electrical contact mounted to the pressure responsive element, the contacts engaging each other while the pressure responsive element is in one of the positions and disengaging each other while the pressure responsive element is in the other of the positions;

an electrical circuit connected to the contacts for providing a signal when a change in one of the positions occurs; and

wherein the pressure responsive element blocks any flow of air through the housing from an upstream side of the housing to a downstream side of the housing.

2. The detector according to claim 1, further comprising:

a cavity located in the housing, the pressure responsive element being located in the cavity;

an upstream air inlet leading from the upstream side of the housing to the cavity on the upstream side of the pressure responsive element; and

a downstream air inlet leading from the downstream side of the housing to the cavity on the downstream side of the pressure responsive element.

3. The detector according to claim 1, wherein the electrical contacts engage each other when the pressure responsive element is in the second position.

4. The detector according to claim 1, wherein the pressure responsive element comprises a thin, plastic film.

5. The detector according to claim 1, further comprising:

a tube protruding from the upstream side of the housing for communicating air pressure to the pressure responsive element upstream of the filter, the tube adapted to penetrate at least a portion of the filter while the housing abuts the downstream side of the filter.

6. The detector according to claim 1, wherein the tube has a closed upstream end and a sidewall containing a port adjacent the upstream end.

7. A detector for mounting to an air filter, comprising:

a housing adapted to be mounted to an air filter;

a cavity in the housing;

a diaphragm located in the cavity;

an upstream air inlet leading from an upstream side of the housing to an upstream side of the diaphragm, the upstream air inlet being located so as to communicate air pressure on an upstream side of the filter to the upstream side of the diaphragm;

a downstream air inlet leading from a downstream side of the housing to a downstream side of the diaphragm, the downstream air inlet being located so as to communicate air pressure on a downstream side of the filter to the downstream side of the diaphragm;

a stationary electrical contact stationarily mounted in the cavity and normally spaced from the downstream side of the diaphragm;

a movable electrical contact mounted to the downstream side of the diaphragm for movement therewith; and

an electrical circuit connected to the electrical contacts, so that movement of the diaphragm due to a sufficient difference in air pressure between the upstream and downstream air inlets causes the contacts to engage each other and causes the electrical circuit to provide a signal.

8. The detector according to claim 7, wherein the upstream air inlet comprises a tube adapted to penetrate at least a portion of the filter.

9. The detector according to claim 8, wherein the tube has a closed upstream end and an opening along its sidewall adjacent the upstream end to communicate air pressure to the interior of the tube.

10. The detector according to claim 7, wherein the movable electrical contact comprises a flexible metallic strip mounted flush to the downstream side of the diaphragm.

11. The detector according to claim 7, wherein the stationary electrical contact comprises a metallic pin extending through a portion of the housing normal to the diaphragm.

12. The detector according to claim 7, wherein the housing comprises:

a body having a central recess formed therein;

an upstream plate secured to the body over the central recess, defining the cavity, the upstream inlet extending through the upstream plate, the diaphragm having a perimeter mounted to a downstream side of the upstream plate; and

wherein at least a portion of the downstream air inlet extends through the body.

13. The detector according to claim 12, further comprising:

a downstream plate secured to the body opposite the upstream plate, at least a portion of the downstream air inlet being formed in the downstream plate.

14. A method of detecting a condition of an air filter, comprising:

(a) mounting in a housing a movable pressure responsive element, a stationary electrical contact, and a movable electrical contact, the movable contact being mounted to the pressure responsive element for movement between a first position in which the contacts are in disengagement with each other and a second position in engagement with each other; then

(b) mounting the housing to the filter;

(c) flowing air through the filter;

(d) communicating air pressure on an upstream side of the filter to one side of the pressure responsive element, and communicating air pressure on a downstream side of the filter to the other side of the pressure responsive element, and causing the pressure responsive element and the movable contact to move if a difference between the air pressures is sufficient;

(e) once the difference in air pressures reaches a sufficient level, causing the contacts to change from one of the first and second positions to the other of the first and second positions;

(f) monitoring the change in the positions of the contacts with an electrical circuit and providing a signal when the change occurs; and

(g) preventing any air flow from an upstream side to a downstream side of the housing during steps (c)-(f).

15. The method according to claim 14, wherein in step (d), when the sufficient pressure difference occurs, the contacts will move from the first to the second position.

16. The method according to claim 14, wherein the pressure responsive element blocks any air flow from flowing from the upstream side to the downstream side of the housing.